

COUNTY OF SAN DIEGO  
DEPARTMENT OF ENVIRONMENTAL HEALTH

VECTOR CONTROL PROGRAM



**ANNUAL REPORT  
CALENDAR YEAR 2003**



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## **I. INTRODUCTION**

The Vector Control Program (VCP) has been protecting the public's health from disease carrying vectors for over 30 years. Since July 1, 1989, the Vector Control Program (VCP) of the County Department of Environmental Health (DEH) has provided countywide vector prevention and control services under the powers of a vector control district, as adopted by the County Board of Supervisors.

Mosquito, domestic rat, fly and other vector detection and control programs are provided to reduce the risk of diseases these vectors can transmit and to minimize nuisances. A vector is any insect, rodent or animal capable of transmitting human disease or causing human discomfort or injury. Surveillance through trapping and testing vectors is key to detecting disease before it spreads to humans. Control of vectors, which is guided by surveillance, is critical to preventing vectors from transmitting disease to humans.

This report describes the activities of VCP during the past year and forecasts anticipated events in the near future.

## **II. WEST NILE VIRUS STRATEGIC RESPONSE PLAN**

Working with Health and Human Services and Agriculture Weights and Measures, VCP developed the West Nile Virus Strategic Response Plan (Plan), which prepares for the inevitable arrival of West Nile virus (WNV) and creates a response strategy. The San Diego County Board of Supervisors formally approved the Plan in March 2003. The Plan is currently being revised to update positive WNV findings and modifications to address the potential use of adulticides, if determined necessary. We completed the Plan will be posted on the website at [www.sdfitthebite.com](http://www.sdfitthebite.com).

The Plan includes a Risk Assessment tool that considers environmental conditions, mosquito populations, and positive virus findings in mosquitoes, dead birds, horses and humans. There are three categories in the Risk Assessment, normal season, emergency planning and epidemic. In using the Risk Assessment San Diego County is in the emergency-planning phase. The actions the County has taken exceed the actions designated for the planning phase. When the county experiences several human cases it will move to epidemic phase.

In 2003 West Nile virus (WNV) was discovered in San Diego County with five dead birds and one horse testing positive for WNV in October and November. Locally acquired human cases have occurred in Imperial, Riverside and Los Angeles counties, but there have been no locally acquired human cases in San Diego County to date.

A key element of the Plan is education and outreach to inform the public on WNV's potential health risks, the proactive steps the County is taking and the actions each resident can take. WNV outreach included the following in 2003:

- Distributed of WNV protection pamphlets to senior centers and key locations
- Booth development and staffing during the San Diego County Fair, Earthfair and Miramar Air Show
- Developed and maintained [www.sdfightthebite.com](http://www.sdfightthebite.com) webpage.

- Initiated a speaker's bureau
- Aired WNV video on County Television Network
- Held media events to promote WNV awareness

In 2004 we have expanded outreach efforts to include:

- Distribute 500 WNV pamphlet displays to County and city public counters, libraries, schools and public health centers
- Distribute CTN developed video to public health centers, WIC offices, libraries, and schools
- Create Public Service Announcements for television and radio stations
- Create an ad to be included in the Registrar of Voters Handbook
- Create and distribute news articles for inclusion in community newsletters
- Distribute WNV materials to grader school children via the County Office of Education Splash Science Mobile.

Included in the Plan are new surveillance measures as well as some enhancements to existing surveillance, including the expansion of the dead bird-testing program. Some bird species are particularly sensitive to the virus and can provide an early warning that the virus is circulating in the general area. Dead bird testing increased from 28 birds tested in 2002 to 213 in 2003, resulting in the five birds being found positive for WNV in 2003. Mosquito surveillance has increased, see Mosquito Surveillance for details.

VCP conducted aerial application of larvicides to wetlands that are located close to the urban interface and that are inaccessible to Vector staff. A local helicopter service performed five test applications starting in early May and ending in September. The test aerial applications revealed that when applied monthly, starting early in the season (April or May), the larvicides can keep breeding under control for the entire season. Several watersheds totaling 547 acres of mosquito breeding habitat are scheduled to receive monthly aerial applications during 2004. This will minimize potential WNV disease transmission to humans and birds.

Federal and state wildlife officials have deemed helicopter applications appropriate. Use of the helicopter is far less invasive to sensitive habitats than efforts by VCP staff conducting land treatment. Application of larvicides at Buena Vista lagoon takes 30 minutes by helicopter and requires 14 hours by staff on land. Larvicide application by staff cannot replicate the effectiveness of the helicopter because the helicopter can reach all inaccessible areas. The Mosquito Control section of this report provides additional detail on other mosquito control efforts being undertaken.

### **III. MOSQUITO CONTROL**

To prevent and control mosquitoes, the VCP conducts inspections, manages, and identifies mosquito breeding sources at approximately 700 permanent major breeding sources. The sources include both private and public ownership of rivers, streams, marshlands, lagoons, ponds, and various other man-made and natural sources of standing water. During 2003, additional mosquito breeding sources have been identified using the assessor's parcel number. Property ownership enables VCP staff to better enforce the property owner's responsibility to manage/ maintain water that stands for more than 72 hours. Ownership of mosquito breeding sources has been mapped using Graphic Information Systems (GIS).

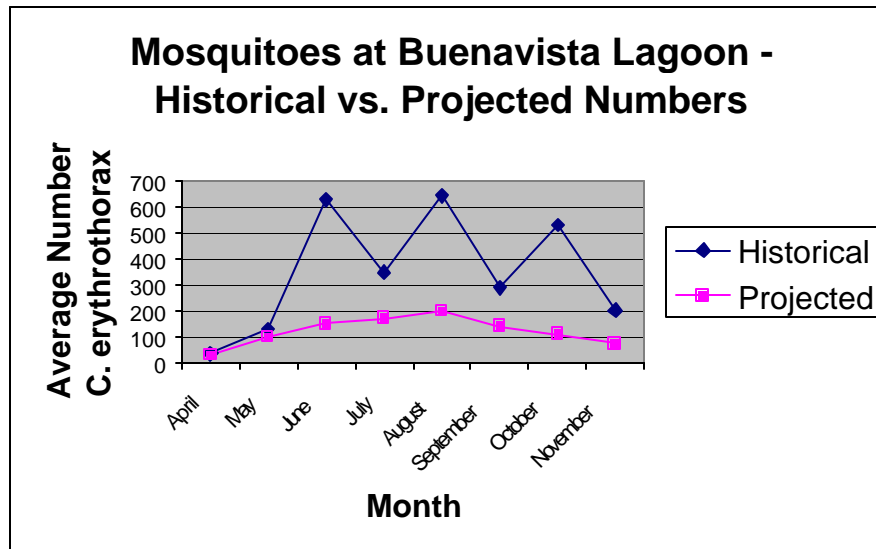
This assists VCP by identifying and stopping adult mosquito production and will be vital when combating mosquito-borne diseases like WNV.

A notable change with VCP's method of source management was prompted by the need for VCP to obtain a National Pollution Discharge Elimination System (NPDES) permit from the State of California, Regional Water Quality Control Board (RWQCB). VCP spearheaded this permit application process with the assistance from other County departments. The NPDES permit obtained by VCP did grant exemptions for all mosquito larvicides but the mandated NPDES permit did require extensive and expensive testing when applying herbicides near or in waters of the United States. VCP has stopped all application of herbicide to reduce mosquito breeding habitat and has shifted efforts to guide property owners, both private and public, to manage their wetlands to decrease mosquito breeding.

Additional mosquito breeding source reduction efforts involve working with new construction and the storm-water requirements of Best Management Practices (BMP). During the permitting process, VCP is initiating proper BMP construction and long-term maintenance to insure mosquito breeding does not occur. Staff reviewed proposed land use projects in the design stages and during permit reviews to provide technical assistance for the prevention and control of mosquitoes as well as other arthropods. Staff participated in pre-application meetings held by the State Department of Fish and Game and the Army Corps of Engineers to emphasize the need for project design to reduce areas that could breed mosquitoes. In addition, staff participated in various wetland and lagoon management meetings and provided mosquito source management recommendations for incorporation into the operating plan.

In 2003, staff responded to 2,247 citizens' complaints or service requests regarding mosquito nuisances and breeding. This was a 281% increase in complaints compared to 2002. While many complaints involved major sources, most involved smaller or intermittent backyard sources. VCP staff has been shifted to mosquito control from rodent control efforts to respond to complaints, but even with reallocation resources the average complaint response time increased from 4.2 days in 2002 to 7.8 days in 2003.

As was previously stated, VCP has conducted aerial application of larvicides to wetlands that are located close to urban interface and that are inaccessible. These test applications were needed to discover the most effective application method of mosquito larvicide; lowest impact to wildlife; frequency of application; and the logistics and costs of applications. Larvicides used include *Bacillus thuringiensis israelensis* (BTI) and *Bacillus sphaericus* (BS), which are naturally occurring types of bacteria that create ulcers in the digestive lining of mosquito larvae resulting in larval death. When applied to water bodies at 15 pounds per acre and a mixture of 2:1 ration BS:BTI, it is a deadly combination specifically to mosquito larvae. The chart below illustrates the historical mosquito breeding for Buena Vista Lagoon and the projected breeding with the use of the aerial applications of larvicides. This is a new tool that VCP will use to control mosquitoes in larger waterbodies, freeing up staff to control efforts at smaller water sources and respond to citizen complaints.



Mosquito fish are natural predators of mosquitoes and VCP has given residents free fish from our Hazard Way office. VCP has improved its capability to hold and breed mosquito fish by installing six new tanks with a new filtration system. In 2004 additional sites are being offered where the public can more easily pickup mosquito fish. The Department of Parks and Recreation offer fish at Lake Morena County Park and Lakeside Community Center. The Department of Agriculture Weights and Measures is offering fish from their San Marcos office. Additionally, VCP has solicited pet stores and stables that are interested in providing fish free of charge. To date, 7 businesses have volunteered to give away fish to county residents. These locations are posted at [www.sdfightthebite.com](http://www.sdfightthebite.com).

#### IV. DOMESTIC RAT CONTROL

In 2003, VCP staff responded to 2,924 citizens' complaints or service requests relating to domestic rats. Each of these complaints or service requests resulted in a consultation with residents and site investigation, when necessary to assist residents in excluding rats from their home. Due to the shift in staffing to mosquito control rodent complaint response times have increased. In 2002 VCP had a 4.3-day response time to rodent complaints, which increased to 5.0 days in 2003.

The practice of providing rodenticide bait to residents was discontinued due to liability issues. Improper placement of the bait by the resident has raised concerns for the safety of animals and children. VCP continues providing inspections and consultations and on how residents can exclude rodents from their homes along with guidelines for securing and placing resident-purchased bait stations. VCP staff coordinated work with other regional agencies to prevent and eliminate rat infestations and harborages. As with mosquito control, educational presentations were provided to a wide range of audiences to promote prevention and control of domestic rats.

The State's worst wildfires in October 2003 caused wood rats to become homeless. VCP responded to 194 rodent complaints and initiated a rat-poisoning program only in the fire-impacted zones of the county. This service was vital to control displaced native rat

populations that have moved to the only harborage left, standing homes, trailers, and vehicles.

## **V. FLY CONTROL**

VCP responded to 395 citizens' complaints of excessive numbers of nuisance flies during 2003. One hundred and twenty of these complaints involved commercial poultry ranches. VCP responds to residential complaints relating to houseflies and lesser houseflies as opposed to agricultural operations with associated fruit flies.

In 2003, 29 poultry ranches were in operation in San Diego County. Three Notices of Violation were issued to two poultry ranches. These violations were immediately corrected. Also in 2003, members of the Fly Abatement and Appeals Board met twice to discuss industry issues and provide guidance to the program.

Exotic Newcastle Disease limited the amount of on ranch inspections that could be performed. With at least 6 ranches de-populating their ranches complaints dramatically decreased. Drastic increases of bio-security have been implemented both by VCP and by poultry ranchers to prevent the spread of the diseases. All complaints were handled over the phone and approximately 15 ranch inspections were performed. The decreased level of poultry ranch inspections resulted from the potential spreading Exotic Newcastle Disease to non-infected ranches by inspectors.

Many non-poultry fly complaints originated from small sources of fly breeding. All vector control technicians are trained to inspect and solve these small sources of fly breeding. Public education about sanitation and fly breeding habitat was performed. VCP responds to residential complaints relating to houseflies and lesser houseflies as opposed to agricultural operations with associated fruit flies.

VCP staff again worked closely with the Del Mar Racetrack operators to prevent fly breeding at the facility and at area mushroom farms, which process the manure and bedding materials from this racetrack.

## **VI. VECTOR-BORNE DISEASE SURVEILLANCE**

### **A. Mosquito Surveillance**

**West Nile Virus (WNV).** VCP has enhanced its mosquito surveillance and control program to address the threat from WNV through several measures. Mosquito trapping and testing increased from 48 pools in 2002 to 98 pools in 2003. Mosquito trapping has expanded to year round, by trapping known hot spots to detect off-season trends. VCP anticipates testing 200 mosquito pools in 2004. New surveillance devices called "gravid traps" will be used in 2004 to capture mosquitoes that have already had a blood meal and are seeking a place to lay eggs. By capturing mosquitoes that have already fed increases the chances of finding mosquitoes that may be carrying viruses.

WNV was not found in the 98 pools (a pool = 50 mosquitoes) of mosquitoes or sentinel chickens (three flocks of 10 birds per flock) tested during 2003. There were no

confirmed human cases of WNV or other mosquito-borne diseases reported in the county during 2003. Dead bird testing increased from 28 birds tested in 2002 to 213 in 2003, resulting in five birds being found positive for WNV in 2003. The positive dead birds were found throughout the county; Valley Center, Scripps Ranch, El Cajon, Deshesa area and Protrero. A horse was also found positive for WNV in October near Descanso. This was the first horse reported positive for the virus in the state. VCP responded to these positive virus findings by conducting extensive surveillance and control in these areas.

**Western Equine Encephalitis (WEE).** WEE was found both in mosquitoes and sentinel chickens sampled in the county during 2003. This virus has not been found in the county since 1972. One of the 11 pools of mosquitoes of *Culex tarsalis* sampled from the Penasquitos Lagoon area in August was positive for WEE, while two sentinel chickens were seropositive for this virus in November from the flock near the Buena Vista Lagoon. VCP staff responded by larviciding these areas, posting mosquito warning signs, and by issuing news releases.

## **B. Rodent Surveillance**

Since the arrival of WNV in the county, surveillance and control efforts have been shifted from rodent surveillance to mosquito surveillance. Given the limited number of surveillance staff, this shift will therefore reduce other surveillance activities in 2004, such as plague, Hantavirus, arenavirus, and tick-borne diseases.

**Plague.** No human cases of plague were reported in San Diego County during 2003. Plague infected fleas bite and infect a rodent, usually ground squirrels. These rodents can act as reservoirs. Humans and their pets, when visiting campgrounds or other rural areas, can be infected by being bitten by infected fleas. Squirrels are routinely tested at campgrounds by collecting blood samples and sending them for plague testing. From 1992 to 1998, plague surveillance was conducted at the higher localities and has consistently yielded three or more plague-seropositive ground squirrels. During 2003, 239 ground squirrels were sampled with 6 (or 2.5 %) being seropositive. These seropositives were found at Heise County Park (1), Observatory Campground (2), and at Fry Creek Campground (3). In response to these findings, VCP staff treated the squirrel burrows with insecticidal dust at each of these campgrounds, which reduced flea numbers to less than 1.0 per squirrel. These and other campgrounds at higher elevations are also routinely posted with plague warning signs so as to make camp visitors aware of precautions they should take in order to reduce the risk of becoming exposed to plague.

Beginning in 1996, dust-bait stations used for controlling fleas have also been maintained at Heise County Park and Doane Valley State Park. In addition, plague information pamphlets are provided to park officials to distribute to campground visitors. For 2004, plague surveillance is expected to be reduced because of the shift towards WNV surveillance activities.

**Hantavirus.** No human cases of Hantavirus were reported in San Diego County during 2003. Both the hemorrhagic and respiratory strains of Hantavirus occur in rodents in San Diego County. Humans typically become infected with Hantavirus by breathing air-borne particles of wild rodent droppings contaminated with the virus. Most human

cases occur when people open up and occupy mountain cabins or other small-enclosed structures, which are infested with wild mice.

Sin Nombre is the respiratory strain and was first described in the Four Corners area of the Southwest where numerous deaths occurred during 1993. Hantavirus surveillance began in the county in January 1994 to determine the prevalence and distribution of the rodent species infected with this virus. Results have shown that from five to 20 % of the wild mice trapped were seropositive for the virus. These seropositives were found at 14 localities throughout the county. In 2003, a total of 126 rodents were tested for Hantavirus, with no rodents testing seropositive. However, public education efforts for preventing humans from becoming infected with hantavirus have continued and include: providing information for preventing and controlling wild rodents inside and outside structures and personal protection measures via pamphlets and news releases; and posting warning signs at sites yielding seropositive rodents

During the period from 1980 to 2003, the California Department of Health Services (CDHS) reported 34 human cases of Hantavirus in California. These have mostly been acquired in the state and from areas in the Sierra Nevada Mountains, with only one being found in southern California, in San Bernardino.

**Arenavirus.** In 1998, VCP began monitoring arenavirus in the county. Arenavirus causes a meningitis-type infection called lymphocytic choriomeningitis. This virus has been found in wild rodents in South America and in wood rats, *Neotoma* spp., in the southwestern portion of the United States. The virus is transmitted to humans in a similar fashion to hantavirus, which is described above. To date, three people in California have died after becoming infected with arenavirus. In 2001, VCP Surveillance sampled 374 wood rats with two being seropositive for arenavirus. In 2003, 25 wood rats were sampled with none found to be seropositive. When seropositive rats are found, the site is re-sampled to determine the prevalence of the virus in the rat population, and, if the site is used by visitors, is posted with animal caution signs.

### **C. Tick Surveillance**

**Tularemia.** During 2002 and early 2003, initial tests determined that two wild rabbits from the Encinitas area were found to have died of tularemia. VCP staff responded by collecting 217 pools, representing more than 2,000 specimens of ticks. Several of the positive tick pools were later discovered to be a nonpathogenic strain of Tularemia. Extensive laboratory testing is being conducted to ensure this will not recur.

**Lyme Disease.** Testing ticks in 1994 and 1995 demonstrated that Lyme disease does occur in San Diego County, but there have been no positive ticks since 1994 and 1995. The primary vector for this disease, the western blacklegged tick, is commonly found in most rural areas of the county. Four to five percent of these ticks were shown to be infected. During 2003, 30 pools representing approximately 300 specimens of ticks from 12 localities were sent for testing. These were negative for the Lyme disease. Camp rangers, docent education programs, and other agencies have aided VCP in posting tick warning signs, and in providing information to visitors to outdoor recreational areas regarding precautions and personal inspection techniques that can be used to avoid exposure to this and other tick-borne diseases. Lyme disease

surveillance in 2004 is also expected to be reduced because of the shift of activities towards the prevention and control of WNV in the county.

## **VII. PROGRAM FUNDING**

VCP receives the vast majority of its funding through a benefit assessment paid by all county property owners. For the purpose of funding for VCP, the Board of Supervisors has defined three service sub-regions within the county. These sub-regions are described in detail as follows:

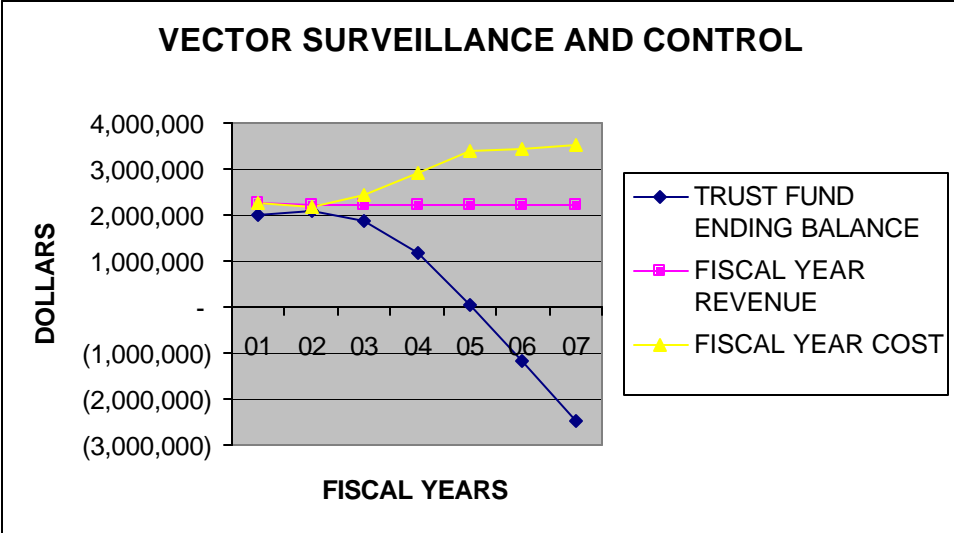
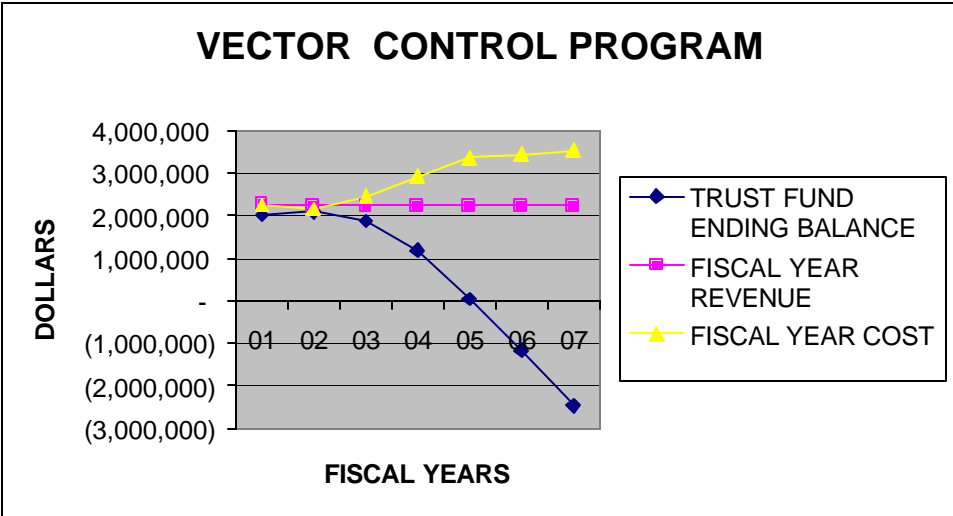
- **Coastal Sub-Region:** The Cities of Carlsbad, Coronado, Del Mar, Encinitas, Imperial Beach, Oceanside, San Diego and Solana Beach and Unincorporated Areas included in the following School Districts: Cardiff, Del Mar, Encinitas Union, Rancho Santa Fe, Solana Beach, San Ysidro, South Bay Union, Unified Coronado, Unified Carlsbad, Unified Oceanside, and Unified San Diego.
- **Inland Suburban Sub-Region:** The Cities of Chula Vista, El Cajon, Escondido, La Mesa, Lemon Grove, National City, Poway, San Marcos, Santee and Vista and unincorporated areas included in the following School Districts: Cajon Valley Union, Chula Vista City, Escondido Union, Lakeside Union, La Mesa-Spring Valley Union, Lemon Grove, National City, San Pasqual Union, Santee, Valley Center Union, Unified Poway, Unified Ramona, Unified San Marcos, and Unified Vista;
- **Inland Rural Sub-Region:** Areas included in the following School Districts: Alpine Union, Bonsall Union, Dehesa, Fallbrook Union, Jamul-Los Flores Union, Julian Union, Pauma, Spencer Valley, Vallecitos, Warner Union, Unified Borrego Springs, and Unified Mountain Empire.

The current benefit assessments are:

- Coastal Sub-region: \$3.00/per parcel
- Inland Suburban Sub-region: \$2.28/per parcel
- Inland Rural Sub-region: \$2.28/per parcel

This past year staff were shifted to mosquito control to address WNV and increasing complaints, reducing the effort in rat control. Even with these efforts VCP anticipates the need to hire temporary staff in 2004 to meet the expected increase in workload. Unfortunately these short-term strategies will not provide a satisfactory level of service, for the same benefit assessment, in the foreseeable future.

In 1989 the Board originally set higher rates and program staffing was approximately 50 staff. The current staffing level is 22. Even though VCP has reduced its staffing levels, costs have increased and the Trust Account has been used to make up the difference between costs and income from the benefit assessment. The increased costs for WNV exacerbates this situation. As the following illustrates, normal costs and WNV costs will exhaust the Trust Account by the end of FY 04-05.



The County is conducting a Zero Based Study of the Vector Control program to determine the correct public health protection and service levels. This study will explore options for funding the program. The County will seek the Ad Hoc Committee's input on the program's future.